

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-092398  
(43)Date of publication of application : 28.03.2003

(51)Int.CI.

H01L 29/06

(21)Application number : 2001-283918  
(22)Date of filing : 18.09.2001

(71)Applicant : FUJITSU LTD  
(72)Inventor : OSHIMA TOSHIO

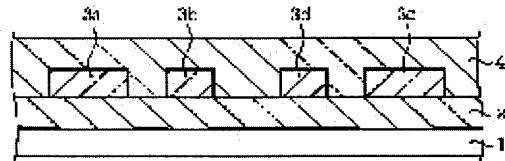
## (54) QUANTUM CIRCUIT DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a quantum circuit device for performing an arithmetic operation by using quantum dots capable of realizing stable and high speed operations.

**SOLUTION:** This quantum circuit is provided with asynchronous coupled dots obtained by connecting a main quantum dot 3a to an arithmetic quantum dot 3b whose size is smaller than that of the main quantum dot 3a, asynchronous coupled quantum dots obtained by connecting a main quantum dot 3c arranged apart from the main quantum dot 3a with a distance substantially incapable of tunneling to an arithmetic quantum dot 3d arranged apart from the arithmetic quantum dot 3b with a distance capable of tunneling, and a laser element for emitting a laser beam with wavelength resonating with the inter-level energy of the asynchronous coupled quantum dots to the asynchronous coupled quantum dots.

本発明の第1実施形態による量子回路装置の構造を示す概略断面図



\* NOTICES \*

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

## CLAIMS

---

(57)[Claim(s)]

[Claim 1]

In a quantum computer, at least one transmission line to which a signal which performs control or read-out of said qubit is impressed is included in relation to operation of a qubit as which a logic state is expressed in it, and said qubit,

A circuit where it is located in a specific position to which it is a point in a transmission line whose signal is zero, and a paragraph for predetermined frequency met a transmission line in if a signal is impressed, and said qubit is arranged at a position corresponding to at that time.

[Claim 2]

The circuit according to claim 1 where said predetermined frequency contains F01 frequency which is a delta frequency between a state where energy of said qubit is the lowest, and a state where energy of said qubit is low to the 2nd, and has the largest operation that produces decoherence in said qubit.

[Claim 3]

The circuit according to any one of claims 1 to 2 where said paragraph is located in 1/4 wave of position from an end of said at least one transmission line in said basic motion frequency.

[Claim 4]

The circuit according to any one of claims 1 to 3 where said paragraph is generated by one of short circuit ends and open ends on said at least one transmission line.

[Claim 5]

The circuit according to any one of claims 1 to 4 where said at least one transmission line includes a superconducting material.

[Claim 6]

The circuit according to any one of claims 1 to 5 where said at least one transmission line contains one of a coplane stripline and the microstrip lines.

[Claim 7]

The circuit according to any one of claims 1 to 6 where said paragraph contains a current paragraph which is a voltage antinode in said transmission line about said qubit.

[Claim 8]

The circuit according to any one of claims 1 to 6 where said paragraph contains a voltage paragraph which is a current wave belly in said transmission line about said qubit.

[Claim 9]

The circuit according to any one of claims 1 to 8 which an input impedance of said transmission line adjusts to output impedance of a circuit which performs either controlling said qubit or reading a state of said qubit mostly.

[Claim 10]

The circuit according to any one of claims 1 to 9 which is connected to said transmission line, provides one of current and the voltage, and includes one of a current source and the voltage

sources for offer \*\*\*\* in said qubit.

[Claim 11]

In a quantum computer, it is how to form a qubit circuit about a qubit as which a logic state is expressed in it,

A step which provides a transmission line to which it is used in order to perform either controlling said qubit or reading a state of said qubit, and a signal is impressed,

A method comprising:

It is located in a specific position to which a signal is a point in a transmission line which is zero, and met a transmission line in a paragraph for predetermined frequency when a signal was impressed.

A step which arranges a qubit in a position corresponding to at that time.

---

[Translation done.]